



FOREST HEALTH PROTECTION

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South Sierra Shared Service Area

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Status of Douglas-fir Tussock Moth in Stanislaus National Forest, California, Winter/Spring 2006

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Background

The Douglas-fir Tussock Moth (DFTM), *Orgyia pseudotsugata* (Lepidoptera: Lymantriidae), is a native defoliator of Douglas-fir and true firs in western North American coniferous forests. White fir is the primary host in California. Outbreaks of this insect tend to occur within its range somewhere between seven to thirteen years. Under outbreak conditions, defoliation by larval feeding can result in top-kill, severe growth loss over large expanses where hosts have been affected, or increased vulnerability to other damaging agents. Populations of DFTM can be so high in some areas that host trees can be quickly stripped of foliage within a short period of time, directly resulting in tree mortality. Public health also becomes a concern because larval hairs have been shown to have an urticating effect that can cause skin lesions, eye irritations, or respiratory reactions ("tussockosis").

In the summer of 2003, early warning pheromone monitoring systems of adult males positioned in specific locations around the forest, indicate that DFTM populations were starting to increase from endemic low levels. By 2004, DFTM populations were detected to still be building, and limited egg mass sampling indicated that increased defoliation would be expected in 2005-2006.

Population monitoring/Observations

Larval sampling was conducted in 2004 and 2005 (Table 1) by FHP around monitoring traps with high counts and areas of special concern designated by district personnel (FHP Report NE05-07). 2005 early-warning monitoring trap results for central California were recently sent out (DFTM Survey Report NE06-01); detailed Stanislaus monitoring results are presented in Table 3.

Discussion and Recommendations

Based on aerial detection surveys conducted in 2005, specific locations (quads 4741, 4732, 4744, 4733) have been identified on the forest where populations of DFTM are causing severe damage host trees and posing public health hazards (see Appendix A). In Yosemite National Park which also experiencing a severe outbreak in two of its main campgrounds, several people have already been treated for symptoms of tussockosis.

Vertebrate predators, insect parasitoids, and species-specific viruses naturally regulate tussock moth populations. Consequently, outbreaks typically last three to four years, but duration can still vary. Outbreak progression has been characterized in separate phases: pre-outbreak, release, peak, and decline. If the current populations in the Stanislaus stay along this course, they can be expected to peak this year, then decline by 2007 due to natural factors. However, there is the potential for extensive top-kill and grouped tree mortality in and around the Pinecrest Experimental Forest within these two years. Egg mass surveys found 4.90 egg masses on average (see Table 2) within the heaviest defoliated areas. At the intersection of Forest Service roads of 4N33 and 4N99 (T3N, R18E, Sections 4, 5, 8, 32, and 33), much of the understory and smaller diameter class trees were observed with >80% defoliation. Little to no defoliation is predicted in Hull Creek and Pinecrest campgrounds since 0.7 egg masses/average were found. However, visual observations at Hull Creek found many small diameter trees with 30%-50% defoliation, and larval sampling concluded 4.88 larvae/average that could indicate more moderate defoliation to occur. Concurrent analysis of egg mass samples by a Canadian laboratory is underway to determine present levels of naturally occurring nuclear polyhedrosis virus (NPV) in population. Early warning trap monitoring, defoliation and egg mass surveys will continue in 2006. Larval surveys will be implemented if needed.

At this probable stage of the outbreak, realistic and feasible mitigation actions would involve the use of insecticides or foliage protection for hosts. Chemically formulated NPV is the most commonly recommended insecticide – it is species specific and has been shown to effectively reduce populations with one application. There is a five-to-eight week incubation period after treatment applications before larvae cease feeding. Chemical or biological insecticides may be necessary at this stage if further defoliation cannot be tolerated. Visitors and employees would likely be impacted by tussockosis if allowed to enter into infested areas. Seasonal closures would ensure limited contact with insects, and posted warnings would promote hazard awareness.

If management actions are to be implemented in a timely manner for 2006, preparation should be initiated as soon as possible. A letter was sent to Forest Supervisors of the Stanislaus, Sierra, and Sequoia National Forests (dated May 9, 2005) outlining the additional steps required to initiate the NEPA process if Forests intend to implement a DFTM control project by spring 2006.

Please contact me if you have questions or would like more information.

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References

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Table 1. 2005 Douglas-fir Tussock Moth early stage larval densities in Stanislaus NF.

*M is average midcrown density: <2 is two or more years away from outbreak, 2-19 larvae is typically one year

Ranger District	Plot name	*M <2	*M = 2-19	*M >20
Miwok	Burst Rock/Crabtree Trailhead	0.08		
Miwok	Fraser Flat	0.36		
Miwok	Dodge Ridge Ski Area	0.7		
Miwok	Pinecrest Recreation Area (RS)	1.88		
Miwok	Hull Creek Campground		4.88	
Calaveras	Cottage Springs campground	0.16		
Calaveras	Sand Flat campground	0.2		
Calaveras	Big Meadow	0		

away, and >20 is outbreak.

Table 2. 2005 Average egg mass survey results from three high priority locations, Stanislaus National Forest.

Location	Ave. egg mass per three branches*
Hull Creek Campground	0.15
Pinecrest Campground	0
Pinecrest Experimental Forest	4.90

*Less than 0.7: light to no defoliation; 0.7-1.9 expect moderate but variable defoliation; >2.0 expect severe defoliation, top-kill and mortality

Table 3. 2005 Mean average adult moths captured in early-warning monitoring system traps for Stanislaus National Forest.

Summit	Strawberry2	42.4
Summit	Chinaman1	25.25
Calaveras	Mattley	4.8
Calaveras	Mattley	24.4
Calaveras	Bailey	18
Calaveras	Airola	3.6
Calaveras	Airola	20.4
Calaveras	Skull Peak	39.8
Calaveras	Thunder Hill	22.6
Calaveras	Thunder Hill	24.6
Calaveras	Thunder Hill	32.4
Calaveras	Thunder Hill	34.2
Miwok	Hull Meadow	46.2
Miwok	Two Mile	18.4
Miwok	Reynolds	4.8
Miwok	Little Reynolds	16
Miwok	Dodge	26.4
Miwok	Lilly	40.4
Miwok	Dodge Ridge	23.2
Miwok	Dodge Ridge 2	4.8

*Average number of moths 25 or greater indicates an upward trend, or that an outbreak currently exists.

Appendix A. see 2005 Aerial Detection Survey of Stanislaus National Forest in 2005 Aerial Survey Report. Note: DFTM damage is categorized as “other damage”.
